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Environment Ontario legacy

JANUARY 1983

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Special Edition:

Keith C. Norton

A time to change a time to grow

Of all living things, it is man who can radically change his environment and also rapidly adapt to these changes.

When my ministry was established, it had to resolve a number of problems to fulfill its mandate to improve and maintain the quality of the environment in Ontario.

In the 10 years since, we have found a number of solutions to these problems — solutions that work and achieve distinct improvements.

In other areas, we have defined our objectives and intend to apply long-term solutions.

During the same time, however, our increasing involvement and new technologies have revealed new challenges and have set us new goals.

To be better able to meet these new tasks, I have introduced several changes in the ministry's organization.

The primary objectives of these changes are:

— to ensure systematic planning.

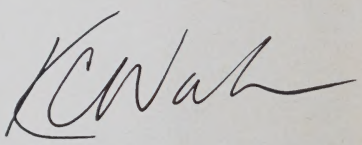
— to provide better service to various client groups and strengthen several existing programs.

— to increase the capability of the ministry to respond effectively to pressing issues.

— to establish and to reinforce the vehicles for policy development and long-range planning.

I am confident that these structural changes will greatly improve my ministry's ability to fulfill our new goal:

To achieve and maintain a quality of the environment — including air, water and land — that will protect human health and the ecosystem and will contribute to the well-being of the people of Ontario.



Ontario

Ministry of the Environment

Hon. Keith C. Norton, Q.C., Minister

Gérard J. M. Raymond Deputy Minister

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Director of Communications Branch.....R.J. Frewin

(photo: Tessa Buchan)

At Environment Ontario's laboratory open house tour, young Toronto students watch a small school of zebra fish raised for the study of the effects of mutagens.

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Man-Environment Conference '82

MOE talks to 3,000 educators in Hamilton

About 3,000 Ontario educators and more than 100 delegates from elsewhere in Canada, the U.S., Europe, Asia, Africa and Australia participated in the Man-Environment Impact Conference 1982 held in October in Hamilton.

Environment Ontario took the opportunity to inform educators, students and other visitors of its educational activities. In one of the largest booths in the Exhibition Hall, the ministry explained the causes, effects and implications of the global phenomenon of acid rain. Information was also available on materials the ministry provides to support educational programs in schools and other educational institutions.

The ministry's air resources branch exhibited one of its most sophisticated mobile air quality monitoring units, the TAGA 3000, to explain its work in the monitoring and control of air pollution.

Ministry experts spoke on a variety of environmental subjects:

Walter Giles, associate deputy minister, intergovernmental relations and strategic projects division, discussed the changes North America's and Europe's aquatic and terrestrial habitats are undergoing as a result of acid rain, and the international aspects of the problem.

William Steggles, environmental technical advisor, explained the ministry's involvement in Canada-U.S. efforts to reduce pollution of the Great Lakes.

David Balsillie, supervisor of atmospheric research and special programs section of the air resources branch, spoke on the research and development of programs related to the controls of spills of hazardous chemicals and on the work of the various agencies in responding to environmental emergencies.

Murray Cheetham, co-ordinator of public affairs and educational programs, reviewed the educational aids, workshops and field programs provided by Environment Ontario to assist teachers, students and the general public in relating lifestyle to environmental impact.

Al Johnson, trace contaminants specialist with the water resources branch, explained the ministry's sport fish testing program and the recently observed decline of the level of contaminants in Ontario sport fish.

The two-day conference was followed by a two-day Cousteau Society festival attended by about 10,000 visitors from Canada and the U.S.

New York cuts pollutant limits

Important revisions were made in a proposed New York State discharge permit for the Niagara Falls, N.Y., sewage treatment plant as a result of interventions by Environment Ontario.

"The amendments to the draft permit resolved our major concerns," Environment Minister Keith C. Norton said in announcing the changes. "The limits for the emissions of PCBs are cut by 75 per cent and for phtalates by 50 per cent. Further controls of other contaminants are provided if monitoring indicates their levels are cause for concern."

Other amendments include a change from measurement of concentrations to measurement of actual amounts discharged. The levels are based on average daily limits. These limits are keyed to the plant's design capacity of 48 million gallons a day, rather than the 60 to 65 million gallons of current actual flow.

"The limits and the method of calculation are designed to provide an incentive to the City of Niagara Falls to reduce the overload on the plant and to operate within its design capacity," Mr. Norton said.

Controls on the discharge of contaminants to the Niagara River, as applied by this permit, will be fully effective in 1984 when faulty carbon beds in the plant have been rebuilt.

Ontario has withdrawn its earlier request for a public hearing because New York State has improved the permit.

Ontario's comments on the original proposed discharge permit and the province's request for a hearing were filed with New York State last March. Comments on the revised discharge permit have just been submitted. These activities have been co-ordinated by the ministry's Niagara River Improvement Team.

"The revision of the permit by New York State is a significant step in cleaning up one of the Niagara River's trouble spots and an excellent example of how international communication and co-operation can be effective when goodwill prevails," Mr. Norton said.

Cutbacks and restraints help reduce record API

On October 27, 1982, the Air Pollution Index in Toronto topped 54, the highest rating registered in Metro since 1975. A static high pressure air mass over most of southern Ontario had locked in pollution over urban centres, causing high API levels in Hamilton, Sarnia and U.S. cities on the shores of the lower Great Lakes.

In addition to ordering cutbacks, Environment Minister Keith C. Norton appealed to Toronto residents not to use their fireplaces and to restrict the use of their cars.

During similar events in the past, sulphur dioxide emissions were primarily responsible for high API levels in the Toronto area. This time, however, the main culprit was particulates, mainly dust.

When the central computer at the ministry's air quality and meteorology section registered an API of 50 at noon October 27, assistant director Lou Shenfeld informed the ministry's Central Region office. Toronto's seven major sources of particulate emissions were advised of the situation. They had voluntarily cut back when the API had reached 32 in the early morning hours. Daryl Hogg and his colleagues of the regional industrial abatement section advised the forewarned organizations of the minister's orders which required them to reduce emissions by 50 per cent by curtailing their operations.

Mr. Norton's appeal was broadcast to Toronto area residents by the media within half an hour of its being issued.

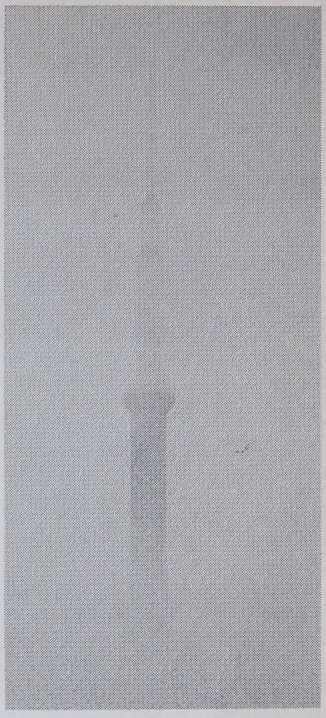
A change in the weather clearing away the stagnant air mass, the cutback measures required by the ministry and the voluntary response to the minister's appeal were effective. During the night, the API decreased in all affected areas below the acceptable level of 32.

Go Gransit, the Ontario Motor League and the Toronto Transit Commission indicated a slight increase in the use of public transit and a decrease in traffic comparable to the change normally associated with the year's first snowfall.

The API is based on the continuous monitoring of the levels of SO_2 and particulates in the air of Ontario's major industrial centres.

At readings below 32, little or no effect on human health has been registered. At 58, people with chronic respiratory diseases may be affected. At 100, mild effects may be felt by healthy people and severe effects by those suffering respiratory and cardiac diseases.

The highest-ever API level, calculated to be 580, was achieved in London, England, in 1962. Several thousand deaths and recorded illnesses were attributed to the condition.



During the high API episode, Toronto's CN Tower managed occasionally to become visible through the mist. (photo: Tessa Buchan)

A few days after the event, Environment Minister Keith C. Norton received the following letter from a Toronto resident:

Dear Honorable Keith Norton:

As a Torontonian and formerly a four-year resident of Hong Kong, I am pleased that the Ontario Government took action on October 27 & 28 to advise us on ways to reduce the pollution index in our city. Your quick action prevented a potentially serious problem from occurring.

It is delightful to be back in Canada where there is an Environmental Protection Act and the government is concerned about the health of the people.

After all, I am sure in Hong Kong a pollution index of 51 would be just another normal day.

Yours very truly,

Y.M. Thompson

Toward the management of toxic materials

A process for the identification, assessment, management and control of toxic materials used in Ontario has been developed by Environment Ontario's new hazardous contaminants and standards branch.

The process will ensure that these materials are dealt with scientifically and efficiently and that any risk their manufacture and use may present to the public is reduced to an absolute minimum.

More than 60,000 chemical substances are used in North America, and new compounds are being continually developed. Some have gained a sinister reputation because of the potential dangers they pose to humans and to the environment.

To identify such substances, the ministry is expanding its facilities to monitor and classify them. To date, 209 priority substances and classes of substances have been identified.

These materials will be extensively evaluated and discussed with other governments. A regularly updated inventory will be maintained to focus research on them in the formulation of policies and programs to deal with them.

The assessment of hazards in the use of such substances requires the co-operation of other scientific and governmental organizations.

It starts with the determination of risks the population and the environment are facing in their use.

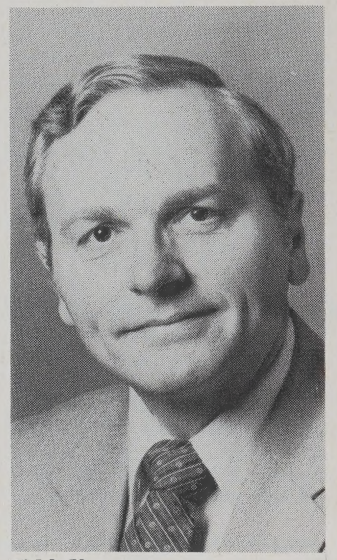
Carcinogenicity, mutagenicity, teratogenicity, acute toxicity and persistence in the environment are being assessed.

The Canadian Chemical Producers Association is working with the ministry in the development of an Ontario industrial chemicals survey. The association provides data on the use, manufacture, import and export of these products and on emissions and discharges to the environment connected with their manufacture and use.

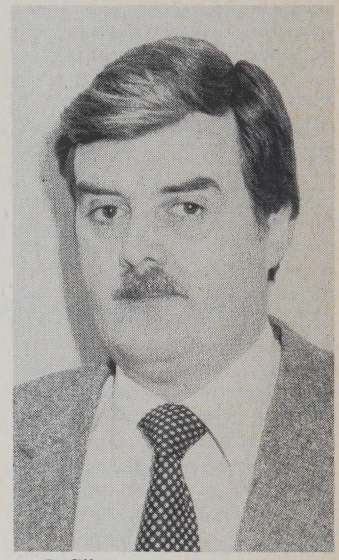
Environment Ontario is also developing standards and guidelines for use, storage and transport of substances which entail risks to human health or threaten the stability of the environment.

Policies providing for public involvement in the establishment of such standards are being formulated.

New regional directors



W.M. Vrooman



W.J. Gibson

W.M. Vrooman has been appointed regional director, Northwestern Region.

Wally Vrooman joined the air management branch of the Department of Energy and Resources Management, as a district engineer, in September 1969. In 1971 he assumed the position of district engineer, Thunder Bay Region. In 1974, he was appointed manager, technical support and since that time has occupied the position of manager, utility operations and manager, industrial abatement.

In addition to these responsibilities, he has been the assistant regional director. Prior to joining the Ontario Government, Mr. Vrooman had seven years industrial experience. He has a BSc. in chemical engineering from Queen's University and is a member of the Association of Professional Engineers of Ontario.

W.J. Gibson has been appointed regional director, Northeastern Region.

Bill Gibson graduated from the Technical University of Nova Scotia in Halifax as a chemical engineer and after nine years of industrial experience in Ontario, Quebec and California; he joined the Ontario Government in February 1969. He occupied several positions in the former air management branch and on reorganization of the Ministry of the Environment, he was appointed manager, technical support. In 1980 he assumed the position of manager, utility operation and assistant regional director. Mr. Gibson is a member of the Association of Professional Engineers of Ontario.

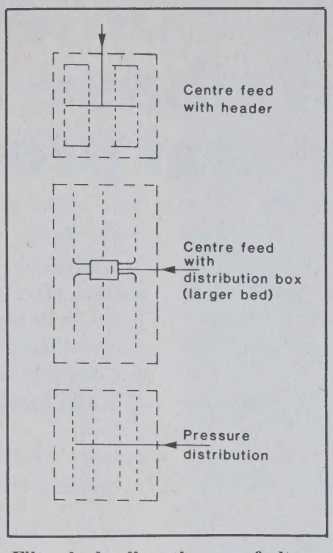
Septic systems may use filter beds

Filter beds requiring less than half the surface area needed for conventional absorption trench leaching beds have been approved by Environment Ontario for use in private septic and aerobic sewage treatment installations, providing certain conditions are met.

The application of filter beds is limited to septic tank systems with a daily sewage flow of less than 5,000 litres. Their functioning depends on the use of a specific type of sand as filter material. The specifications for the sand are contained, with other standards pertaining to filter beds, in Ontario Regulation 374/81.

In a filter bed system, a distribution pipe network is set in a continuous layer of 19 mm clear stone or clean gravel of between 19 and 53 mm size. Below this layer of stone lies the sand filter of a minimum depth of 75 cm over soil of a percolation time not exceeding 50 minutes.

The base of the special sand medium may have to be extended beyond the area of its surface to cover an area of underlying soil that will promote infiltration. The extent depends on the characteristics of the underlying soil.



Filter beds allow the use of alternate pipe layouts.

A filter bed of a maximum size of 50 square metres can be used either for a new private septic tank system or for the replacement of an inadequate tile leaching bed. It is especially suitable for installation on small lots if the site conditions, primarily the soil conditions, are such that the volume of liquid introduced into the filter can be absorbed by the soil under and around the filter without breaking out at the surface or causing the ground to become spongy.

The cost of the installation will depend largely on the cost of aggregate or gravel and of the filter medium, all of which may not be available locally in all areas of the province.

All other specifications for the construction and maintenance of private septic systems, including clearances to wells and watercourses, capacities of septic tanks and distances from dwellings, remain unchanged.

The design and construction of a private septic tank sewage treatment system is subject to approval by the Ontario Ministry of the Environment or its agencies, normally local health units. Both can be contacted for additional information.

Cottagers receive Self-Help awards

Three southeastern Ontario cottage associations received 10-year commemorative plaques from the Ontario Ministry of the Environment for assisting the ministry in the Self-Help for Recreational Lakes Program.

The Battersea-Loughborough Lake Association, located on Loughborough Lake near Kingston, and Otty Lake Association, situated on Otty Lake south of Perth, have been sampling since 1973. White Lake Water Quality Committee has been sampling the lake located southwest of Arnprior since 1972.

During the 1982 Self-Help Lake sampling period, 75 lakes were monitored by more than 100 people representing many southeastern Ontario cottage associations. In 1972, the program involved five lakes with very few participants.

Environment Ontario supplies cottage associations with sampling kits to measure water clarity and to collect water samples bi-weekly during the ice-free season.

These samples are mailed to the nearest Ministry of the Environment laboratory for analysis. At the end of the sampling season, participants receive an Environment Ontario report on the lakes involved in the program that year.

Costs per sample including kit, mailing, administrative costs and analysis expense are about $10. Similar samples collected by ministry staff would cost over $20 per sample.

Environment Ontario staff conduct intensive surveys in the ice-free months on regional recreational lakes. These surveys and resultant data allow the Ministry of Natural Resources to plan fish management in these lakes and Environment Ontario to make recommendations on future shoreline development.

Special report:

Environment Ontario starts new phase in environmental protection

Environment Ontario is one of the first government environmental agencies in the western world to react to recent radical changes in the perception of environmental dangers by reorganizing its human and material resources.

The reorganization has been designed to improve the ministry's ability to:

- **Deal effectively with the minuscule amounts of potentially dangerous materials newly detected by vastly improved analytical techniques.**
- **Deal effectively with damages caused by the long range transport of pollutants across international boundaries.**
- **Continue its successful fight against traditional forms of water, air and land pollution.**
- **Improve the use of public input in the development of environmental standards.**

Gérard Raymond:

"We must meet the needs of better-informed people"

In preparing this special edition on the reorganization of the ministry, LEGACY interviewed Environment Ontario deputy minister Gérard J.M. Raymond for comment on the impact of the realignment on the ministry's work and on the achievement of its goals.

LEGACY: How do the challenges of the 70s differ from those of today?

DEPUTY MINISTER: In the short span of ten years since the establishment of the ministry, our perception of environmental issues has changed radically.

In the 60s and 70s the emphasis lay on the control of traditional potential pollutants such as sulphur dioxide and municipal solid waste. Today we are challenged by new environmental problems — acid rain, for example, and toxic contaminants in waterways and landfills.

We also must meet the needs of a public that is more and better informed and has higher expectations about the quality of the environment in which they would like to live.

Solution of these new problems calls for better coordination both internally and with other levels of government. The changes in the organization of the ministry very much reflects a strong effort to satisfy this need.

LEGACY: One of the problems facing government organizations in dealing with newly recognized pollutants is the evaluation of risk since it seems impossible to remove some of them completely without curtailing the quality of life. Has Ontario come closer to solving the problem of risk evaluation?

DEPUTY: We are just getting into the use of risk assessment in our decisions. The difficulty lies in the fact, that there is no consensus among the public on what is an "acceptable" degree of risk.

The public's perception of risk is highly subjective. If the risk is taken voluntarily — as, for example, driving a car or smoking a cigarette — the threshold of acceptance is very high. On the other hand, the concerns over the

effects of certain contaminants on health are probably over-stated.

Risk can be estimated scientifically, but the acceptance of particular levels must be resolved on a wider basis.

This is the important role of public participation. Our challenge is to develop a public participation process that will work for us.

LEGACY: In the past a high percentage of the ministry's budget was allocated to sewage and water treatment. Will the new focus on newly revealed pollutants affect any change?

DEPUTY: Here we must distinguish between those areas of the budget in which we have some latitude in spending and the areas in which we lack such discretion. In the operation of water and sewage treatment plants, we can change very little. These costs are fixed and will probably increase as prices for energy and materials used in treatment operation increase.

In the other areas there have been significant shifts of funding into the high priority areas of waste management and the control of hazardous substances. This shift will continue.

LEGACY: Such a shift may affect the individual in Ontario. If it does, how will the provision of services to over 90 per cent of the province's population by sewage and water treatment be affected?

DEPUTY: The commitment to provide safe drinking water and properly treated sewage remains one of the highest ministry priorities and we have no intention of lessening our efforts.

What has changed is the administration of the program. In essence this is a shift from ministry-constructed facilities to the support of local efforts through government grants given to local governments by the ministry.

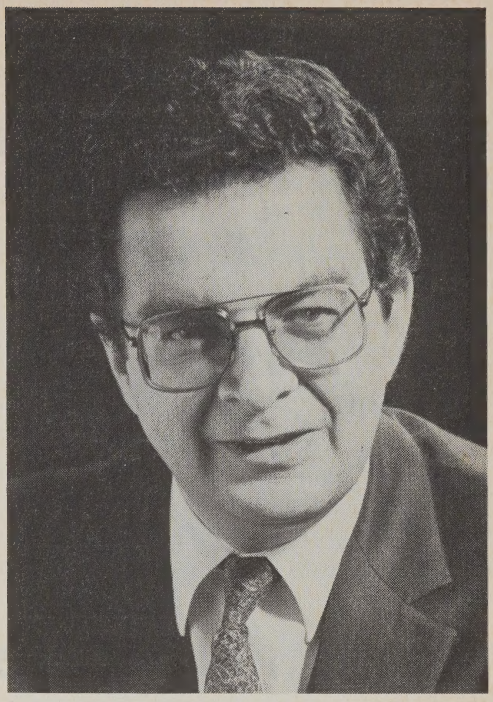
Some ministry construction will continue where necessary, especially to serve very small communities and to deal with inter-municipal projects. The loan program will continue to be necessary and funding will be provided.

LEGACY: Much of the ministry's work is done in its six regional offices. Will the changes in head office organization affect the regional operations?

DEPUTY: There will be some effect in the regions. But I am sure that they will result in a more streamlined connection and in an improved coordination of the work at the head office and in the regional offices.

LEGACY: Our new perception of environmental problems has shown that some of these problems can be solved only by the cooperation of several varying jurisdictions. Recently, the ministry has directed considerable effort on interventions in the U.S. concerning acid rain and, also, industrial waste disposal along the Niagara frontier. Will this effort be maintained?

DEPUTY: Our commitment to represent Ontario's



Gérard J.M. Raymond

interests in proceedings beyond our borders will, of course, continue and we will concentrate on those issues that have the greatest potential of actual impact on our environment in Ontario. We will also focus on situations in which the relaxation of standards would increase the deposition of pollutants in Ontario.

Up to now, our actions have had some beneficial results and we are still at work in other areas where there is still much to be done. We have definitely achieved a broader public recognition of the problems of acid rain and industrial waste in the U.S. and this is a major result of our activity to date.

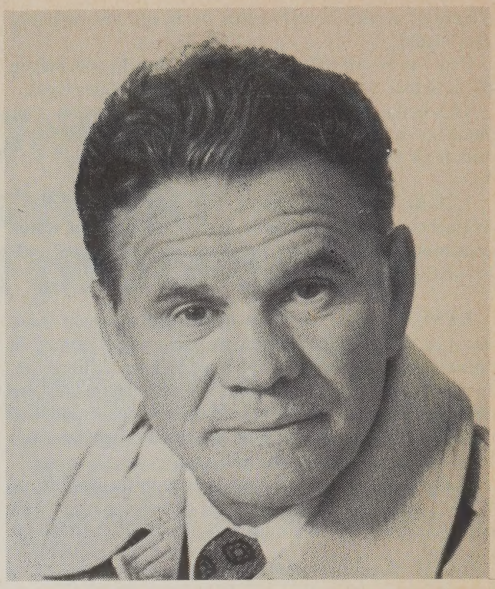
One of the goals of the ministry reorganization is to increase the effectiveness of our representations in U.S. forums. Both the acid rain and the industrial waste problems have been identified as strategic projects and have been brought together under the direction of an associate deputy minister. This office is now in a better position to draw on the resources within the ministry.

The reorganization is doing more than that. We have rearranged the ministry's branches into more meaningful divisions and clarified the responsibilities concerning these issues:

— hazardous contaminants and standards.
— environmental approvals and project engineering,
— capital financing and revenue.

Our next task is to employ the ministry's new management process to make our new organizational structure function at peak efficiency.

W.B. Drowley



William Bidell

'Streamlining strengthens controls'

The reorganization of the Ministry of the Environment involves the creation of new positions and new branches to cope with new problems. The streamlining of other units will assure the strengthening of effective pollution control methods used in the past.

J.W. Giles, assistant deputy minister, has been named associate deputy minister for intergovernmental relations and special projects. He is responsible for the acid precipitation co-ordination project, the intergovernmental relations and the emergency response offices.

An enhanced environmental planning division includes air resources, water resources and waste management branches and the new laboratories and applied science branch.

A new hazardous contaminants and standards branch assumes the responsibility for co-ordinating the development of controls for hazardous contaminants and for establishing environmental standards.

The new environmental assessment branch typifies the thrust toward preventive environmental action. By co-ordinating the ministry's responsibilities under the Environmental Assessment Act, it contributes to the control of environmental hazards through prevention.

The responsibility for regional offices remains substantially unchanged. A new environmental approvals and project engineering branch consolidates most of the existing approval and engineering functions in the regional operations division.

An improved approach to public input into the development of environmental standards is the task given to Executive Director W.B. Drowley, in his role as special advisor to the minister.

A reorganized financial and administration division consolidates the handling of expenditures relating to the construction of municipal water and sewage projects.

A new policy and planning branch reports directly to the deputy minister on its evaluation of policies, programs and resource needs and ensures the effective management and use of all ministry resources.

The communications and the legal branches, the French language and the affirmative actions offices also report directly to the deputy minister.

The Environmental Assessment Board, the Environmental Appeal Board, the Pesticides Advisory Committee, the Farm Pollution Advisory Committee, the Waste Management Advisory Board, the Board of Negotiation and the Ontario Waste Management Corporation report directly to the minister.

William Bidell, assistant deputy minister, is co-ordinating the implementation of the new ministry structure.

The reorganization is the first major reshuffling of the ministry since the regionalization in 1974 which resulted in an improvement of the ministry's service to all areas of the province.

The new organization:

ENVIRONMENTAL PLANNING DIVISION

The role of the environmental planning division is to develop plans and programs:
(a) to protect air quality
(b) to protect surface and ground water quality and quantity
(c) to manage wastes
(d) to ensure an adequate quality of drinking water, and to promote the consideration of the environment in the planning and development of projects.

Air resources branch

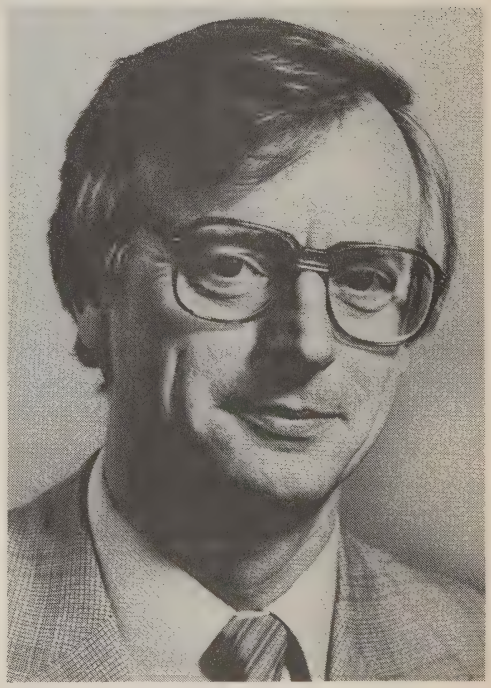
ROLE:
To protect and to monitor air quality
OBJECTIVES:
1. To determine and to regulate the presence, the transport and the effects of airborne substances
2. To assess and to control the impact of noise
3. To provide expertise on air pollution control technology

Water resources branch

ROLES:
(a) To protect and upgrade water quality
(b) To develop water resources
(c) To conserve and to share available resources
(d) To protect the public from contaminants in water and fish
OBJECTIVES:
1. To assess the presence, the pathways and the effects of waterborne pollutants
2. To regulate water quality
3. To evaluate, protect and enhance Great Lakes water quality
4. To provide expertise on drinking water control and treatment technology

Waste management branch

ROLE:
To manage and to monitor the generation, reuse, collection, transportation, treatment and disposal of wastes
OBJECTIVES:
1. To regulate hazardous, hauled liquid industrial wastes and other wastes requiring special treatment to protect public health and the environment
2. To regulate waste management sites
3. To promote the recovery and use of energy from waste



David E. Redgrave, assistant deputy minister, environmental planning division.

Mr. Redgrave joins the ministry from a position as director, business policy development, Gulf Canada Limited. He has had prior senior experience with the province in the Ministry of Treasury and Economics, as assistant deputy minister, office of economic policy. He also had prior experience in the private sector with the Ontario Chamber of Commerce and Imperial Oil Ltd.

Mr. Redgrave's task will be to develop comprehensive integrated plans that will allow the ministry to face the challenges of the 80s. The plans and programs will be designed to protect air quality, surface and ground water quality and quantity, to manage wastes, to ensure an adequate quality of drinking water and to promote the consideration of the environment in the planning and development of undertakings.

Hazardous contaminants and standards branch

ROLES:
(a) To assess the significance and to coordinate control of hazardous contaminants
(b) To establish standards to protect public health and the environment

OBJECTIVES:
1. To identify hazardous contaminants and their potential effects on the environment
2. To determine control strategies for contaminants
3. To control hazardous contaminants and pesticides
4. To identify the ministry's needs for establishing environmental standards
5. To coordinate the development of environmental standards

Environmental assessment branch

ROLE:
To promote the consideration and inclusion of environmental, social and economic alternatives in the planning and development of projects.
OBJECTIVE:
To coordinate the review and evaluation of environmental assessments of projects

Laboratory services and applied research branch

ROLE:
To provide analytical laboratory services and applied research services
OBJECTIVES:
1. To provide sample testing support
2. To analyse pollutants
3. To interpret data
4. To research environmental phenomena.

INTERGOVERNMENTAL RELATIONS AND STRATEGIC PROJECTS DIVISION

ROLE:
To coordinate the ministry's approach to designated critical issues and to integrate governmental activities.

The division also assists in the development of the ministry's position to resolve pollution problems shared with national and international jurisdictions and develops bilateral and multilateral agreements in support of ongoing control strategies.

OBJECTIVES:
1. To deal with designated high profile issues requiring coordination and integration
2. To develop cooperation among jurisdictions

The division is composed of:
- the intergovernmental relations office
- the emergency response coordination office
- the acid precipitation project
- the Niagara River improvement project, and
- the waste disposal site project.

J. Walter Giles, associate deputy minister, is responsible for the intergovernmental relations and strategic projects division.

Mr. Giles had been assistant deputy minister in charge of the environmental assessment and planning division.

A registered professional forester, he started his Ontario Civil Service career with the Ontario Department of Lands and Forests in 1949 and became, in 1972, assistant deputy minister, lands and water, with the Ministry of Natural Resources.

In his new position, Mr. Giles has the task of co-ordinating the ministry's approach to critical issues and orchestrating intergovernmental activities.

REGIONAL OPERATIONS DIVISION

This division is the compliance and delivery arm of the ministry. Its job is to enforce regulations, control emissions, and deliver abatement programs.

ROLE:
To deliver programs to six regions and one head office branch.
REGIONS' ROLES:

1. To regulate pollution sources
2. To regulate construction and operation of wells
3. To oversee the proper development, operation and closure of waste management sites
4. To regulate storage and use of pesticides
5. To manage and operate ministry water and sewage plants and systems
6. To monitor the quality of the natural environment
7. To respond to public complaints and environmental emergencies
8. To encourage use of environmental safeguards in land-use plans
9. To evaluate projects and to monitor environmental assessment recommendations
10. To regulate water use
11. To monitor and investigate discharge to the environment
12. To plan multiple water uses
13. To control noise.

Environment approvals and project engineering branch

ROLE:

(a) To review and process applications required under the Environmental Protection Act, the Ontario Water Resources Act and the Pesticides Act
(b) To promote the consideration of the environment in land-use policies and programs
(c) To provide engineering and construction assistance to municipalities developing water supplies and sewage treatment

Dennis P. Caplice, assistant deputy minister, regional operations.

Mr. Caplice moves to this position from regional director, Central Region. Prior to that he was director, environmental approvals branch, and director, industrial wastes branch. Mr. Caplice has been with the Ontario public service since graduating from university. He recently returned from the National Defence College course.

Mr. Caplice heads the compliance and delivery arm of the ministry. It will be his task to enforce regulations, control emissions and deliver abatement programs in accordance with plans and policies developed by the environmental planning division.

CORPORATE POLICY AND PROGRAM DEVELOPMENT

Policy and planning branch

ROLE:
To evaluate the ministry's policies, programs and resource needs and to efficiently manage those resources.

OBJECTIVES:

1. To assist in policy development and to provide for the coordination and analysis of ministry policy.
2. To develop and maintain the ministry's strategic planning process.
3. To develop and maintain the ministry's operational planning systems and evaluate ministry programs.
4. To manage the ministry's corporate intra-governmental relations.
5. To provide socio-economic expertise.
6. To provide organizational policy support to the deputy minister.

7. To provide analytical and secretariat support to the executive committee, the management committee, and the policy committee.
8. To coordinate the identification of the ministry's research needs and evaluate those needs.
9. To monitor external research performance and encourage the application of research results to the solution of environmental problems.

The branch also coordinates an internal "Management Standards and Improvement Project", following the pattern set by the government-wide Management Standards Project. The objectives of this project are:

- to develop improved management processes appropriate for the ministry's mandate, and
- to apply these processes throughout the ministry's operations.

FINANCE AND ADMINISTRATION DIVISION

This division provides financial, administrative and personnel support and development services and ensures compliance with the Ontario financial and administrative manuals for its four branches and two offices.

Accounts branch

ROLE:
To provide financial support services
OBJECTIVES:
1. To maintain the ministry's financial information system
2. To control and process operating expenditures
3. To support the multi-ministry computerized financial information system
4. To ensure compliance with the Ontario Government's financial policies and procedures

Capital financing and revenue branch

ROLE:
To manage capital and grant programs and to control the receipt of revenues
OBJECTIVES:
1. To administer finances for the construction and operation of provincial water and sewage facilities
2. To pay engineering and construction certificates and grants and municipal expenses for water and sewage facilities
3. To collect revenue due to the ministry
4. To carry out the financial requirements of special funds, cost-sharing agreements and grants
5. To ensure compliance with the Ontario Government's financial policies and procedures

Geoffrey Higham was appointed Executive Director of Environment Ontario's Finance and Administration Division in 1973.

Since joining the Ontario Civil Service in 1965, Mr. Higham has served in various capacities with the Department of Municipal Affairs, the Treasury Board, and as director, government and divisional services branch, Programs and Estimates Division of Management Board.

From 1957 to 1965, Mr. Higham held positions in accountancy and related fields with several local governments in his native England.

Encompassing four branches and two offices, the division provides support and control services to the ministry's operating divisions and provides liaison with the central agencies of the Ontario Government.

Internal audit branch

ROLE:
To examine and evaluate the efficiency, economy and effectiveness of the systems of management control and practices
OBJECTIVES:
1. To appraise the adequacy and application of accounting, financial and other operating controls
2. To promote cost operating controls

Human resources and personnel development branch

ROLE:
To assist and advise on all aspects of personnel management and development.
OBJECTIVES:
1. To administer and develop personnel services
2. To provide payroll and personnel information services
3. To conduct long-range manpower planning and technical training
4. To ensure application of the collective agreement and to resolve grievances
5. To train municipal water and sewage treatment plant operators
6. To develop and maintain the ministry's safety policies
7. To develop and assist in the implementation of a performance appraisal program
8. To work with Ontario educational institutions on training programs for the promotion of environmental expertise
9. To ensure compliance with the Ontario Government's personnel policies and procedures

Administrative services office

ROLE:
To provide administrative support services
OBJECTIVES:
1. To provide purchasing and office support services
2. To ensure compliance with the Ontario Government's administrative policies and procedures

Systems development office

ROLE:
To provide developmental and operating support for the ministry's computerized information system

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Other organizational areas reporting to the deputy minister

Communications branch

ROLE:
To plan and implement communications strategies and programs to support ministry policies and activities.
OBJECTIVES:
1. To provide communications services
2. To provide information to the public
3. To provide library services
4. To encourage the development of environmental programs in Ontario's educational institutions

Legal services branch

ROLE:
To provide legal services to the ministry on a solicitor-client basis.
OBJECTIVES:
1. To prepare legislation and regulations
2. To act as counsel in legal proceedings
3. To advise on the preparation of enforcement instruments
4. To advise on the preparation of contracts

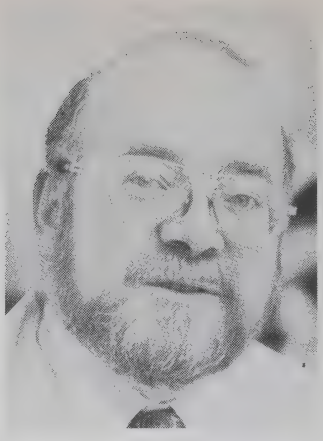
French language services office

ROLE:
To provide coordination of French language services
OBJECTIVES:
1. To establish ministry guidelines that reflect government policy on French language services
2. To deliver a full range of French language services to Franco-Ontarians
3. To ensure that ministry programs respond to the needs of Franco-Ontarians

Affirmative action office

ROLE:
To raise the levels and to diversify the occupational distribution of women employees in the ministry
OBJECTIVES:
1. To develop annual ministry plans for affirmative action in accordance with guidelines provided by the women crown employees' office
2. To assess the impact of structures and practices for the benefit and guidance of employees and managers
3. To develop and distribute information on affirmative action
4. To work with the women crown employees' office, affirmative action coordinators in other ministries and other groups to develop and exchange information.

Paul Rennick



C.E. McIntyre

R.M. Gotts

Career changes

The reorganization of the ministry also resulted in the following appointments:

Paul Rennick has been appointed director, environmental assessment branch. Mr. Rennick graduated from the University of New Brunswick with a B.Sc in forestry, and the University of Waterloo and an MA in regional planning and resource development.

He joins the ministry from a major consulting service in Ontario where he had overall responsibility for environmental assessment and resource planning projects. Prior to his consulting experience, he worked for both the province of Alberta in the Energy and Natural Resources Department and, prior to that, with the Ministry of Natural Resources in various capacities throughout the province.

In his new position, Mr. Rennick will be responsible for the promotion of the consideration and inclusion of environmental, social and economic alternatives in the planning and development of projects.

C.E. McIntyre, P. Eng., has been appointed director, environmental approvals and project engineering branch. Mr. McIntyre joined the Ontario Water Resources Commission upon graduation from university having received a B.Sc in civil engineering and a M.Sc in sanitary engineering.

He has occupied several positions in the ministry and the Ontario Water Resources Commission. On its reorganization in 1974, he was appointed regional direector, Southeastern Region, later moving from Kingston to Sudbury as regional director, Northeastern Region in September, 1977.

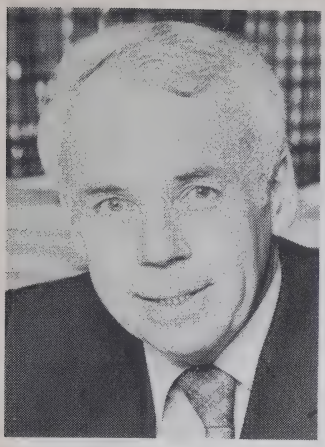
In his new position, Mr. McIntyre will be responsible for the review and processing of applications required under the Environmental Protection Act, the Ontario Water Resources Act and the Pesticides Act, for the promotion of the consideration of the environment in land-use policies and programs and for the encouragement of the development of a water supply and sewage treatment infrastructure through the provision of engineering and construction assistance to municipalities.

R.M. Gotts has been appointed director, waste management branch. Mr. Gotts joined the Ontario Water Resources Commission as an engineer upon graduation from university in 1962. In 1973, he was appointed supervisor, field operations, waste management branch.

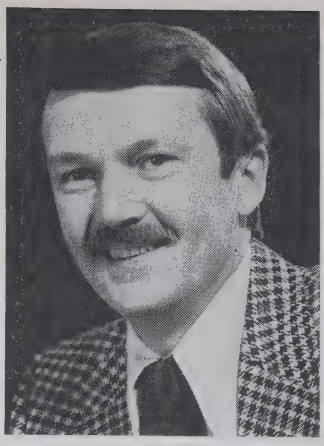
On reorganization of the ministry in 1974, Mr. Gotts was appointed manager, municipal and private abatement section, Northwestern Region. He became director, Northwestern Region, on Sept. 1, 1979. Mr. Gotts has a BA.Sc in chemical engineering from the University of Waterloo and is a member of the Association of Professional Engineers of Ontario.

In his new position, Mr. Gotts will be responsible for the development of plans and programs for the management of the generation, reuse, collection, transportation, treatment and disposal of domestic, commercial and industrial wastes and for the monitoring of the results of ministry activities in this field.

C.J. Macfarlane has been appointed director, hazardous contaminants and standards branch. Mr. Macfarlane is a graduate of Glasgow



C.J. Macfarlane



George Mierzynski

Clem W. Mialkowski

University with a B.Sc in civil engineering and is a member of the Association of Professional Engineers of Ontario. After a career in the British army and immigration to Canada he occupied various positions in the industrial sector.

In November, 1967, Mr. Macfarlane joined the former Department of Health as a senior waste management engineer. In February, 1968, he became a district engineer in the air pollution control branch. He was later appointed assistant director and assumed the position of director on May 1, 1972. On reorganization of the Ministry of the Environment, he was appointed director, Central Region, and became director of the waste management branch on Nov. 1, 1981.

In his new position, Mr. Macfarlane will be responsible for the assessment of the significance of hazardous contaminants, for the coordination of the ministry's activities for their control and for the establishment of standards for the protection of public health and of the environment.

Clem W. Mialkowski has been appointed director, capital financing and revenue branch. Mr. Mialkowski joined the Ontario Water Resources Commission in 1960 after working for the Federated Co-operatives in Saskatoon, Sask.

He has occupied several positions in the OWRC and in the ministry, including departmental accountant, internal auditor and co-ordinator of capital financing. Mr. Mialkowski is a member of the Certified General Accountants Association of Ontario.

In his new position he will be responsible for the provision of financial management for the capital and grant program of the ministry and for the control of the receipt of revenues.

George Mierzynski has been appointed regional director, Central Region. Mr. Mierzynski graduated from the University of Toronto with a BA.Sc in civil engineering and joined the former Department of Highways as an engineer in Sault Ste. Marie in May, 1960. After assuming various positions in that department, he joined the Ontario Water Resources Commission, effective June 1, 1965, as a project engineer.

In June, 1974, he was appointed chief engineer of the project coordination branch and occupied that position until his appointment in August, 1981 as acting regional director, Central Region. Mr. Mierzynski is a member of the Association of Professional Engineers of Ontario.

As regional director, Central Region, Mr. Mierzynski will be responsible for the administration of:

programs for the regulation of pollution sources,

regulations for the proper construction and operation of waterwells,

plans and policies for the development, operation and closure of waste disposal sites and the operation of waste management systems,

regulatory mechanisms for the storage and use of pesticides,

the management and operation of ministry water and sewage plants and systems,

the monitoring of the quality of the natural environment,

the response to public complaints and environmental emergencies,

the review of land-use plans in order to encourage environmental safeguards in land development,

the evaluation of environmental assessments of proposed undertakings and the monitoring of environmental assessment recommendations,

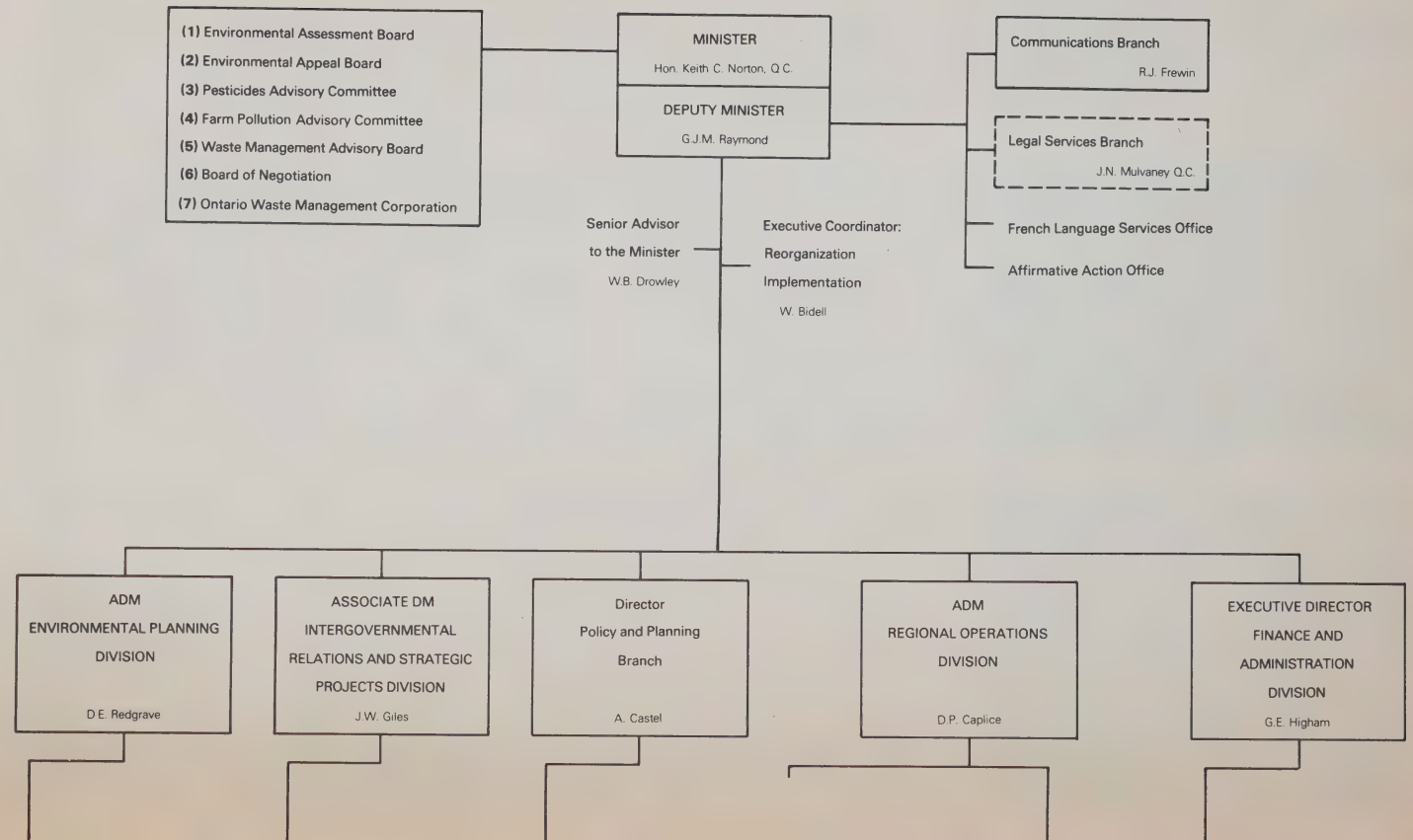
regulatory programs for water use and water supplies,

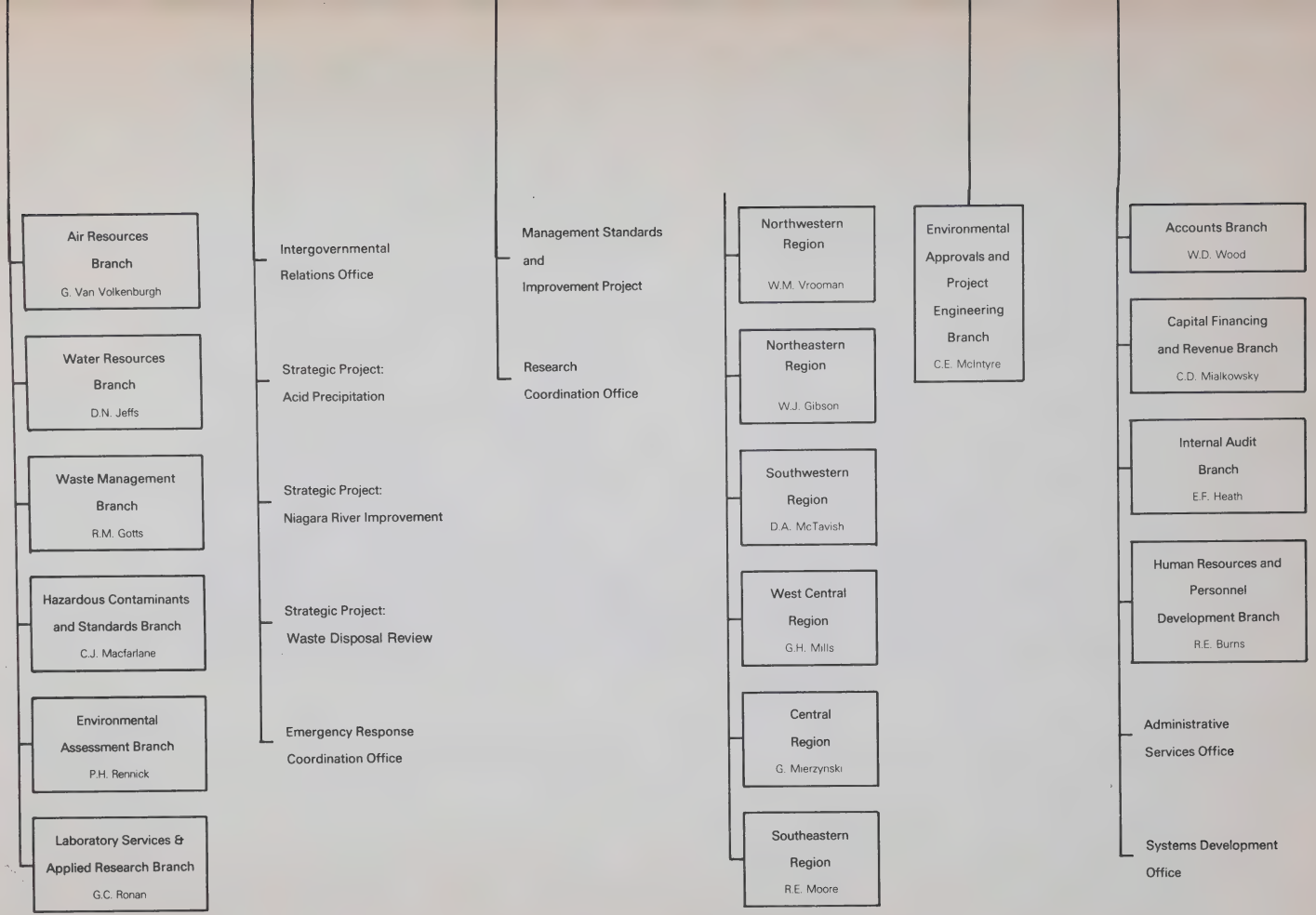
the monitoring and investigation of discharges to the environment,

the contribution to water management plans which will allow for multiple water uses and

programs for the control of noise in the Central Region area.

MINISTRY OF THE ENVIRONMENT




Air Resources Branch
G. Van Volkenburgh
Water Resources Branch
D.N. Jeffs
Waste Management Branch
R.M. Gotts
Hazardous Contaminants and Standards Branch
C.J. Macfarlane
Environmental Assessment Branch
P.H. Rennick
Laboratory Services & Applied Research Branch
G.C. Ronan
Intergovernmental Relations Office
Strategic Project: Acid Precipitation
Strategic Project: Niagara River Improvement
Strategic Project: Waste Disposal Review
Emergency Response Coordination Office
Management Standards and Improvement Project
Research Coordination Office
Northwestern Region
W.M. Vrooman
Northeastern Region
W.J. Gibson
Southwestern Region
D.A. McTavish
West Central Region
G.H. Mills
Central Region
G. Mierzynski
Southeastern Region
R.E. Moore
Environmental Approvals and Project Engineering Branch
C.E. McIntyre
Accounts Branch
W.D. Wood
Capital Financing and Revenue Branch
C.D. Mialkowsky
Internal Audit Branch
E.F. Heath
Human Resources and Personnel Development Branch
R.E. Burns
Administrative Services Office
Systems Development Office

Lottery funds keep research going

The evaluation of blood and urine profiles for the diagnosis of exposure to toxic substances and a study of the effects of fertilizer run-offs on drinking water sources are two new Environment Ontario research projects made possible by a recent $846,800 grant from Provincial Lottery funds.

Other research projects under review for financing from the same grant are:

— the development of a method for detecting sickness caused by viruses in water.

— the development of a method for determining microbiological hazards of leachate run-offs from landfill sites.

— the development of a monitoring scheme to detect persistent toxic chemicals in sport fish.

In addition, the funding will allow the continuation of the following projects:

— the development of an experimental marsh treatment facility at Listowel.

— the application of ozone to drinking water disinfection.

— the characterization and identification of organic substances in drinking water.

— the development of non-chemical (biological) pest control methods.

— the investigation of the effect of road traffic noise on sleep.

— a study of aquatic toxicity of multiple organic compounds.

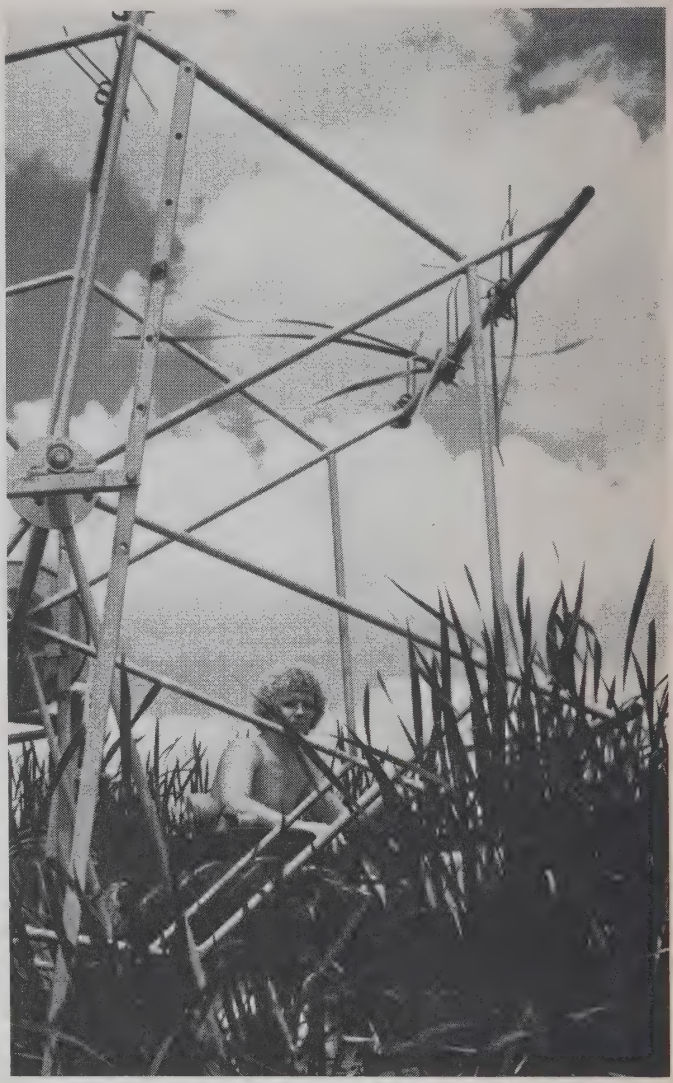
— biological studies of environmental mutagen promoters and inhibitors.

The grant is part of the $9 million allocated to environmental health-related studies provided to the ministry over the past five years by the Provincial Lottery Corporation.

Since such funds became available in 1977, Environment Ontario has initiated more than 50 research projects, of which more than half have been completed.

About half of the projects have been contracted to Ontario universities. The Ontario Research Foundation, municipalities, contractors and consultants were involved in the remaining research projects.

Some of the projects have been funded jointly with the Ontario ministries of health and labor, and Environment Canada.



A ministry technician is harvesting plants growing in Listowel marsh. The plants will be analyzed for their ability to absorb pollutants from sewage.

Deloro gets arsenic removal plant

A backhoe is excavating the 24-million-gallon equalization-storage lagoon on the site of the long-closed Deloro Mines.

(photo: R. Koci)

Construction of Ontario's most effective arsenic removal plant has started in Deloro. The $1.5 million system, designed by Environment Ontario engineers and the consulting firm of Reid, Crowthers & Partners Ltd., will reduce the high level of arsenic leaching into the Moira River from tailings and disposal areas of a long-abandoned mining and smelting operation.

Gold was discovered on the site in 1866 and mining from at least 25 shafts started in 1868. Arsenic, a significant component of the ore, was originally a byproduct of the mining and smelting process but later became one of the main products.

On exhaustion of the orebody in 1904, the Deloro smelter was used for the processing of ores from other mines. Refined silver, arsenic, cobalt oxide, metallic cobalt, nickel oxide and stellite were produced and alloy residues from Northern Rhodesia, the Congo and Morocco were processed. Lack of demand eventually led to the closing of the smelter in 1961.

During about 100 years of the operation at Deloro, various incidents of the poisoning of cattle downriver from the site were reported, and the mine owners tried to overcome the pollution of the river by modifying their operations.

Before the closing of the plant in the 1950s, arsenic concentrations in the Moira River varied from 1.5 to 4.0 milligrams per litre on a yearly average. A treatment plant built in 1962 decreased these concentrations to .3 mg/l.

In 1979, Environment Ontario took over the leachate collection and treatment facilities, and lowered the level of arsenic in the river to 0.16 mg/l on a yearly average.

The objective for arsenic concentrations of 0.05 mg/l in the Moira River could only be achieved by the construction of extensive new collection and treatment facilities. After a thorough study, construction of these facilities was started in the summer of 1982.

The new system will collect leachate from areas of high arsenic concentrations and pump them to a 24-million-gallon equalization-storage lagoon holding tank. The leachate will be treated with ferric chloride and lime in facilities installed in one of the remaining old buildings. This will reduce the arsenic content by 99.5 per cent to an acceptable level.

A concrete berm built along part of the shore of the Moira River will also prevent any leaching of untreated material into the river.

Completion of the system is scheduled for January 1, 1983.

The main contract for the construction of storage lagoon, berms, pumping stations and treatment facilities has been awarded to Duntri Construction of Oshawa. The project is supervised on site by Chris Ramshaw of Environment Ontario's Southeastern Regional office. Project manager is M.H. Toza of Environment Ontario's environmental approvals and project engineering branch.

Laboratory Open House

Thousands see science in action

photos: Hans Eijsenck

Environment Minister Keith C. Norton, Mel Fielding, manager of the applied science section, and Phil Hamel, press secretary to the minister, observe Rod Foggett, ministry research technician, set up an experiment for the open house display.

In observance of the tenth anniversary of the Ontario Ministry of the Environment, the ministry's central laboratory in Rexdale opened its doors to the public for four days in September.

An estimated 3,500 students and teachers, scientists affiliated with environmental interest groups and with private and public laboratories, representatives of the news media and interested citizens toured one of the world's best-staffed, best-equipped and most efficient environmental laboratories and research facilities.

Environment Minister Keith C. Norton opened the event with an address to staff and media representatives.

During the four days, the visitors enjoyed the unique opportunity to ask thousands of questions and to learn about scientific procedures from displays, diagrams and more than 600 photographs shown in the corridors and laboratories.

Most of the laboratory's staff of 300 scientists and technicians conducted tours and explained their work and the operation of their sophisticated apparatus.

The event and the numerous displays were prepared by the staff of the ministry's laboratory services branch

Darka Migus, project scientist and open house co-ordinator, describes the pesticides display to David Redgrave, assistant deputy minister.

A crowd of high school students are waiting for their turn for the applied research section tour.

Tibor Lovasz, biohazard scientist, works in a glove box used for mutagenic testing in the biohazard testing laboratory shown to visitors on Tour A. (photo: Tessa Buchan)

in co-operation with the air resources and communications branches and with Central Region.

To acquaint them with the wide variety of functions performed by Environment Ontario's laboratory, the visitors were invited to join one or several of five tours conducted by experts in the various fields.

TOUR A included explanations and demonstrations of microbiological techniques used in the analysis of water. New virological analysis and biohazard testing laboratories were also shown.

The electron microscopy unit demonstrated its ability to solve environmental problems when only very small quantities of contaminated materials are available. Techniques used to determine asbestos concentrations were also shown.

X-ray analytical spectroscopy was demonstrated at the X-ray fluorescence laboratory.

Helle Tosine, supervisor of the dioxin facility, demonstrates a model of the molecular structure of dioxin to visitors.

Students show interest in the display of vegetation used experimentally to remove organic contaminants from sewage.

The water sample tastes good — it has been silica-treated to remove iron content.

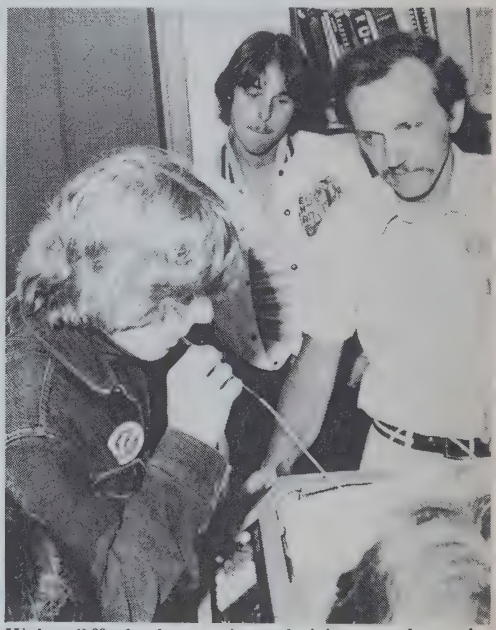
On Tour C a group of visitors study photos showing the activities of the fish toxicity laboratory.

On TOUR B, working models were used to show some of the ministry's research projects concerning drinking water and sewage. Included were pilot plants, field simulation and treatability studies used to solve problems and develop new technology.

On TOUR C, experts from the toxicology laboratory displayed their fish breeding stocks and demonstrated with posters, photographs and actual experiments the purpose and methods of bioassays in fish.

Daryl Russell, mercury laboratory technician, shows how mercury levels are determined in fish

Mike Rawlings, supervisor of the water quality, rivers and lakes laboratory, explains automated wet chemistry procedures.



Walter Offenbacher, senior technician, watches a visitor using a portable gas chromatograph set up for alcohol analysis.

TOUR D — the water quality analysis/acid rain studies section — started with an introduction to the laboratory's computer system. The computer assigns sample analyses to the appropriate lab and records and prints the results obtained. Experts showed how chemical analyses are used to monitor water quality, assure pure drinking water and check sewage treatment facilities.

In the acid rain section, samples were analysed on the spot.

TOUR E led visitors through sections concerned with the analysis of trace contaminants in air, water, soil and fish. The pollutants involved included pesticides and herbicides, heavy metals, petroleum products, pulp mill effluents, aromatic hydrocarbons and "priority pollutants"

In the outdoor display the ministry's air resources branch opened the mobile laboratories operated by the monitoring and instrumentation development unit to visitors.

leaching from landfill sites.

In addition, a number of mobile laboratories and one of the ministry's Great Lakes sampling boats were shown in an outdoor display.

The vessel on display was one of several used to sample water and sediments in the Great Lakes. It allows scientists to analyse water quality parameters on board and to prepare the remaining samples for transport to the laboratory.

The aquatic toxicity unit demonstrated its mobile laboratory used for on-site biological testing of industrial discharges.

Another mobile unit shown is used by the water quality section to support the ministry's Acid Precipitation in Ontario Study and the Great Lakes monitoring survey by providing on-site analyses.

The monitoring and instrumentation development unit of the ministry's air resources branch showed four vehicles:

The MAMU 2, which provides computer-controlled meteorological instrumentation and analyzers for such pollutants as SO_2, carbon monoxide, ozone and some hydrocarbons.

MAMU 3, which contains a highly specialized mass-spectrometer.

TGA 3000, which can detect a wide variety of compounds at picogram per cubic metre levels in air.

MAMU 4, which serves as a mobile workshop for servicing the other vehicles and is also equipped to collect samples.

MAMU 5, which carries spare parts, compressed gas and other supplies used in the detection and analysis of air contaminants.

Sterilized males save onion crop

by John Ladell

Biological pest control works. That is the conclusion reached by the first experimental release of 200,000 sterilized male onion maggot flies this summer in the Holland Marsh area north of Toronto. The experiment reduced the proportion of fertile maggot fly eggs in the area from 70 per cent to 40 per cent within a short time.

The maggot fly males were raised and sterilized at the new biological pest control laboratory of the Department of Environmental Biology at the University of Guelph. The project was financed by the Ontario Ministries of the Environment and Agriculture and Food. (See also Legacy, February/March 1982)

3,000 acres of onion fields

In the Guelph laboratory, onion maggot flies are now raised to the pupa stage on a production line. The pupae are placed in cold storage to be sterilized by cobalt radiation. In the spring of 1983, between 15 and 20 million sterile males will be released over 3,000 acres of onion fields in the Holland Marsh.

Uncontrolled, the maggot fly could destroy three out of four onions of the $10 to $30 million crop. It has been singled out for the first biological pest control experiment in Ontario because it has an extraordinary ability to develop resistance to a new chemical pesticide within two to three years. This means that it becomes resistant faster than a new pesticide can be developed.

The problem can be solved only by the use of a system similar to the one nature applies to keep a reasonable balance among all living things. This system is called biological pest control.

Biological pest control has a number of advantages. It can be focused on a single or on a very narrow range of species. It can be applied without endangering other living things, including plants and humans, and it is not likely to leave long-lasting residues in the environment. The species under attack may develop defences or may adapt in some way to biological control, but the process seems to be much slower than the development of resistance against conventional pesticides.

no lasting residues left

The definition of biological pest control may vary. Entomologists — scientists studying insects — may define it as the control of insects and plant diseases through predators, parasites and other disease-causing agents. Farmers, foresters and gardeners may include in their definition the breeding of disease-resistant plants, the destruction of diseased or affected plants, the rotation of crops, and other similar means.

In its broad sense, biological pest control has been around a long time. The Romans preached the virtues of crop rotation 2,000 years ago. In its narrower sense, biological pest control is just about a century old.

It began in the 1880s when the cottony cushion scale insect threatened the citrus fruit crop in California. The arsenic compound then used as an insecticide failed to control the pest. Eventually, a natural enemy of the insect was brought in from Australia — the Valadia ladybird beetle — and the citrus crop was saved.

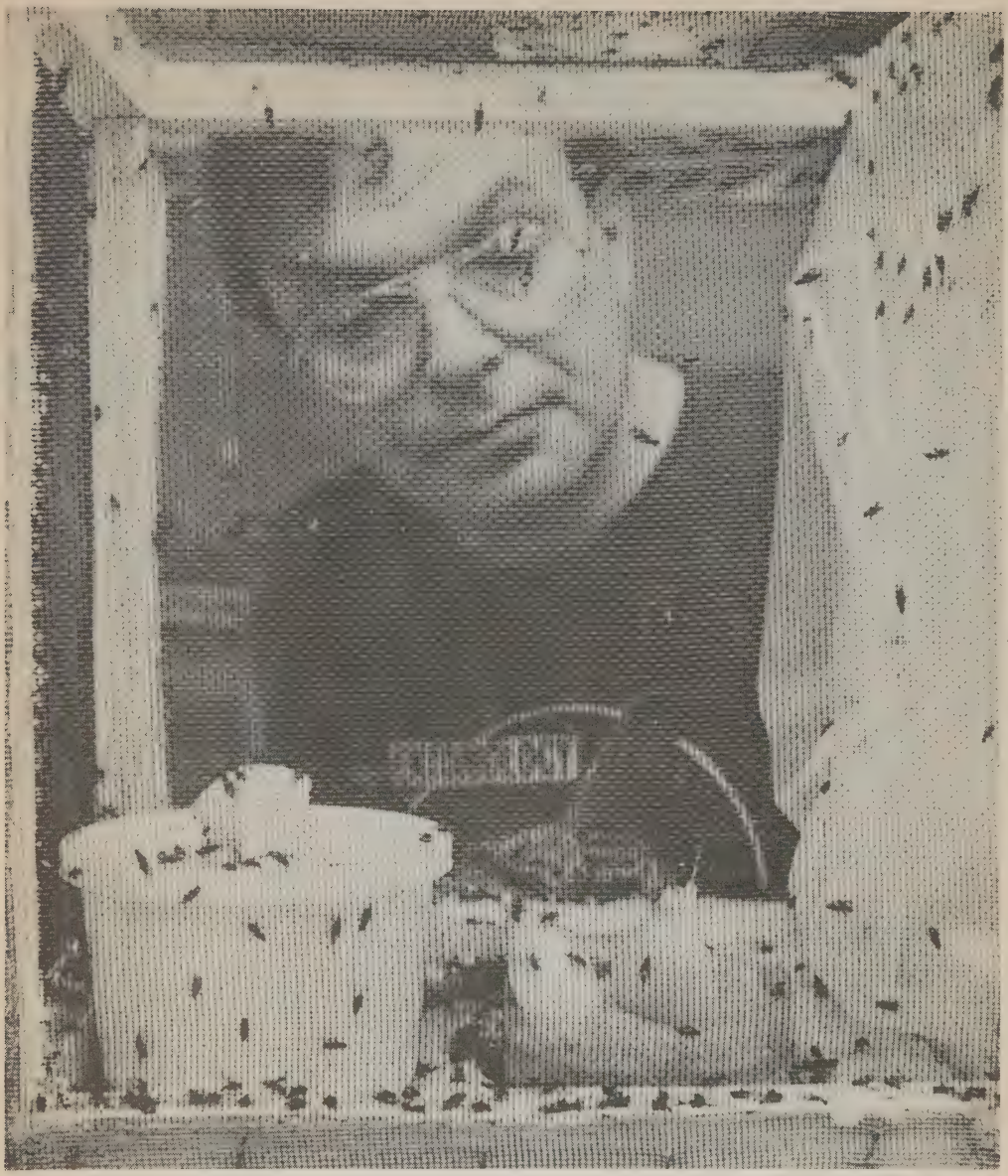
In Canada, the first parasitic insect was imported from England in 1910 to combat the larch sawfly, a major forest pest. A short time later, an alarming outbreak of the brown-tail moth was fought successfully by parasites supplied from the U.S.

But for the most part, insect control in the early years was by means of "natural" poisons such as nicotine alkaloid extracted from tobacco, or pyrethrum, derived from dried chrysanthemum flowers.

Tomato and tobacco crops were hand-picked to avoid the large and easily visible hornworms that infested them. Various types of insect traps were used. Sticky bands on orchard trees prevented the ascent of caterpillars and wingless moths. Bands of burlap or cardboard provided a convenient site for pupating or hibernating codling moth — whose larva, the apple worm, is still a leading orchard pest. Periodically, the bands were collected and destroyed, and the moths and pupae with them.

natural poisons were once used

These methods worked rather well, in fact better than chemical pesticides are doing today. In 1904, crop losses to insect and disease in the United States averaged about 11 per cent; in a recent year, the average was about 13 per cent.



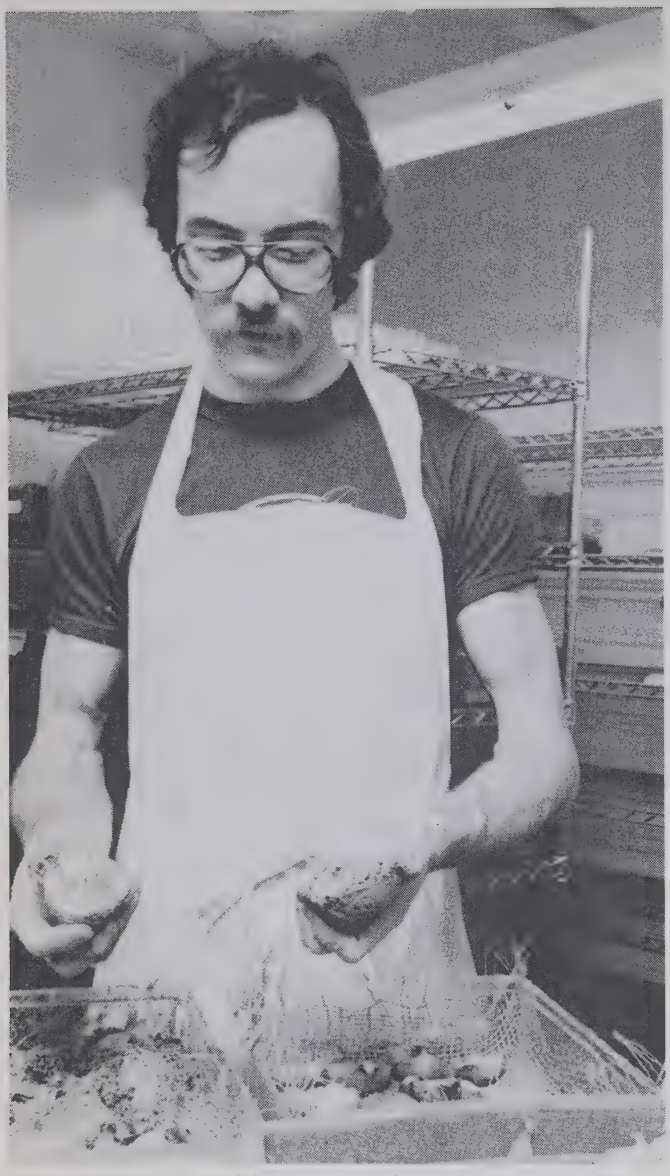
Technician checks caged onion maggot flies, a major pest on the Holland Marsh. Release of sterilized males has sharply reduced their numbers. (photo: Services Dept., University of Guelph)

In 1939, Paul Muller, a Swiss scientist, discovered DDT and received the Nobel Prize for his discovery. Research on nerve gases during World War II led to the development of even more powerful insecticides.

As a result, biological pest control was sidelined and old skills were forgotten. After the closing of the federal biological laboratory at Belleville in 1971, biological pest control in Canada was left without a focal point.

Farmers and growers in Canada and in other countries turned to the chemist to solve their pest control problems.

The results of 40 years of almost total reliance on synthetic chemical pesticides are very bad.



At the biological control laboratory at Guelph, a technician inspects onions used to raise the maggots which after pupation will develop into adult flies. (photo: Services Dept., University of Guelph)

While the world's population is increasing by 2 1/2 million hungry mouths a year, we are now using 10 times the amount of pesticides we used in 1940. Since then crop losses have doubled. Well over a quarter of the world's supply of rice has been lost to insects. In Asia, crop losses average 21 per cent; in Africa 10 per cent; in North and Central America 9 per cent. Europe is doing somewhat better at 5 per cent. In 1940, we used 40 different pesticides. Today we use over 200. What has gone wrong?

Insects have developed pesticide-resistant strains. Early in the 1900s U.S. farmers found that the San José scale, an orchard pest, was no longer controlled by lime sulphur sprays. In 1915 certain insects became immune to hydrocyanic gas.

In the 1920s the codling moth developed an immunity to lead arsenate.

Insecticides are applied to deal with a certain species of insect. Most of them die, but some may survive and reproduce. The process is repeated until a totally resistant strain emerges.

360 species are immune

Today over 360 species of insect have developed pesticide-resistant strains — over three times as many as 12 years ago.

The emergence of pesticide-resistant strains is one reason why chemical pesticides are failing. Another is over-use. Working to a spray "calendar", a farmer may apply a pesticide when it is not needed. In doing so he may hasten the build-up of a resistant strain, which with its natural enemies killed by the spray now becomes even more abundant than it was before. Such blind applications of pesticides may backfire in other ways. With the elimination of one species, another more resistant to pesticides may thrive and become a brand-new pest.

Underlying all this is the threat that synthetic pesticides pose both to ourselves and the environment. Many of the compounds are impervious to the natural processes of breakdown and decay. In their long-lasting form they pollute the environment and place our health and our lives at risk.

In 1954, a now-classic experiment in biocontrol was carried out on the island of Curacao in the Caribbean. The target was the screw-worm fly, a

The facilities of the laboratory include a greenhose where plants are grown for the rearing of insects.

(photo: Services Dept., University of Guelph)

major cattle pest in Central America and parts of the southern U.S. Thousands of male screw-worm flies, sterilized by exposure to short-wave radiation, were released to compete with the wild males. In weeks there was not a screw-worm fly to be found on the island.

Now the same method is applied in Ontario to control the onion maggot fly.

But the onion fly is not the only target of the Guelph lab. Another one is the spruce budworm, Canada's most destructive insect.

In 1981, over 70,000 square miles of Ontario's forests were under attack, with trees dead or dying in half the stands affected. Possibly due to a freak snow storm in June, 1981, the epidemic is now on the wane. In 1982, the infested area had shrunk to only 31,000 square miles, but there are a lot of valuable trees in 31,000 square miles.

Except for the short-term protection of selected high-yield stands, large-scale applications of chemical insecticides in Ontario were halted in 1976. Since then, the Ministry of Natural Resources has used a method of biological control widely used in agriculture: mass treatment with Bacillus thuringiensis, a bacterium that causes deadly crystals to form in the gut of the budworm larva.

Now Environment Ontario is funding another biocontrol attack on the budworm. This involves one of the budworm's natural enemies, a parasitic wasp called Trichogramma minutum. Trichogramma is a minuscule, half-millimetre-long wasp that lays its eggs in those of the spruce budworm. They hatch and destroy the budworm egg. The mature wasp emerges and the females search for more budworm eggs.

The feasibility of controlling budworm through mass releases of Trichogramma is under study by Sandy Smith, now working for her PhD. at the University of Toronto. Working at the Faculty of Forestry under Dr. Martin Hubbes, she is not only assessing the effect of such releases but is characterizing different strains of Trichogramma to select the one best suited to a control program.

Involved in the study are the Ministry of the Environment, the Ministry of Natural Resources, the Canadian Forest Service and the biological control laboratory at Guelph where Trichogramma are being reared in the huge numbers required.

Dr. John Laing, head of the new Guelph laboratory, stresses that agriculture pests must be our primary concern. Along with the onion maggot fly, agriculture pests now under attention at the laboratory include the spotted tentiform leafminer (an orchard pest) and insects that attack cabbages, cauliflowers and other vegetables.

Biological pest control is not the complete answer to our problems, but combined with chemical pesticides, it can go a long way towards reducing our losses in agricultural and forest crops. Cost-benefit analyses have shown that a successful biological control program leads to a saving of $20 per year for every dollar invested in research. This is a return that is not easy to overlook.

Termites adapt to Ontario weather

Fire, flood, wind, termites, theft: Which word doesn't belong with the others? The answer: Termites, one of the few things insurance doesn't cover in Ontario.

The subterranean termite is the most destructive, the most widely distributed and perhaps one of the most interesting species in North America. Although man has often been called the most adaptive creature on earth, the termite runs a close second.

Living in colonies ranging from the size of a football to the size of a football field, the termite society is composed of several castes. Each caste fulfills a specific function within the colony. The female reproductives lay eggs; the soldiers defend the colony from outside attack; the workers feed the queen, and the nymphs care for the eggs, build tunnels and carry out various other duties.

Termite colonies are usually established through three methods: swarming, budding, and dispersal. In the southern United States, swarming is common. Female reproductives emerge from the colony in the early spring, fly a short distance, mate, and then establish new colonies. In Ontario, swarming is rare, because of the climate.

More common in Ontario is budding. Budding occurs when a colony becomes large enough to break into smaller colonies, or when a portion of the colony becomes separated from the main colony. Secondary reproductives are formed and the nucleus of a new colony is established.

From the time that it hatches to the time that it dies, a termite rarely departs from its set role in life. However, an exception to this rule is known as dispersal.

Fifteen to 40 workers can start a colony of their own if they are separated from the rest of the colony. The absence of a female triggers a chemical reaction in the workers, enabling them to evolve into supplementary reproductives, capable of laying eggs.

Most insect species evolve to a terminal state, unable to alter their form or function. In this respect, the termite's survival ability is unique. It not only allows the termite to establish a new colony, but it also ensures the survival of the species.

Also unique to the termite society is its need to exist in a closed, sheltered system. Because termites have very thin skins and tend to dehydrate quickly, they must live in a moist, enclosed habitat and avoid exposure to the air. This they accomplish by containing their colonies within the soil or within an outside shell of cellulose material, such as wood.

Shelter tubes, constructed of soil particles cemented together with secretion, allow termites to scout for food sources and at the same time protect them from exposure to the air. These tubes, approximately 1/4'' to 1/2'' wide, may extend several feet from the colony. In 12 hours, an average colony can construct 1 1/2 feet of tubing.

Because of their ability to digest cellulose, any wood or

wood product is food for termites. The damage they do to the wood is rarely superficial.

Termites do not reduce wood to powder or push wood particles to the outside. They follow the internal grain of the wood, hollowing out galleries and passageways. Usually, the surface of the wood must be stripped away to reveal the internal damage.

According to 1974 insurance figures, termites caused more structural damage in the United States than fire. In Canada, termite activity is restricted to Ontario and British Columbia.

In Ontario, termites were first reported in Point Pelee in 1929. They had entered the province as stowaways in driftwood and cottage materials. Since then, their population has increased steadily. Termite activity was reported in Toronto in 1928, in Windsor in 1950, in Kincardine in 1954, in Oxley in 1955, in Amherstburg and Dresden in 1968, and Guelph in 1975. Now termites are found in over 25 locations in Ontario. Sections of Toronto and East York suffer from the worst infestations.

The homeowner, however, is not alone in his struggle to fend off these destructive insects. Termite infestation can be chemically controlled and, if done properly, there is no chance of re-infestation for up to 25 years.

In areas identified as having termite activity, Environment Ontario provides termite control grants for residential properties. These grants provide for 60 per cent of the cost of chemical treatment (up to a maximum of $2,000) and for 60 per cent of chemical pre-treatment (up to a maximum of $1,000). The ministry also makes available information on identifying and preventing termite infestation.

In most municipalities, those suspecting termite infestation can call on their local planning or building departments. Experts are available to inspect properties for termites and to advise the owners on available tenders and grants.

It's all one world...

Rare species fight their way back

All too often, reports dealing with the environment are negative and discouraging, but recent studies show encouraging signs of hope, notes Bio-News, a newsletter published by Gartner Lee Associates Ltd.

Increases in osprey numbers were noted during studies of the North Thames and Scugog River areas. Other species, such as the pileated woodpecker, have adapted to changing environmental conditions — the woodpecker to present-day smaller woodlots in southern Ontario.

In New York City, the endangered peregrine falcon has been known to nest and raise young on the ledges of skyscrapers. The falcons feed on pigeons.

A classic example of improvement is the return of the Canadian beaver. The beaver disappeared almost completely from the landscape by 1930 because of the fur trade. Through proper harvesting and management practices it has made a comeback to such an extent that it is considered a pest in some areas. Recently, beavers were sighted near Oshawa and within the city limits of London.

The black redhorse, a species of fish that was suspected of being extinct in Canada, was discovered recently in the Nith and the North Thames Rivers.

Gartner Lee Associates Ltd. is a consulting engineering firm specializing in geology, hydrology and biology.

Salmon are returning to London

In 1981 seven adult salmon were caught in the Thames River and many more were sighted as far as 100 km upriver from London. They were the first of 50,000 yearling salmon (parr) seeded in the Thames in 1979 by the Thames Migratory Fish Committee.

The last commercial catch of salmon in the Thames was registered 161 years ago, in 1821. After that, it took two outbreaks of Asiatic cholera in 1840 and 1850 to convince the authorities that a sewage system was necessary. Westminster draped in sheets soaked in disinfectants to hide the river's stench helped too.

The sewage works of the time did not include treatment. By 1950, the Thames was anaerobic again and devoid of life.

Thames' water quality was only improved after construction of sewage treatment plants at Beckton, Crossness and other places.

These plants improved the water quality to such a degree that a variety of less sensitive fresh water and marine species returned by themselves to the Thames Estuary. Eventually in 1979 re-stocking with salmon could be attempted.

Ben Wicks

"Take a memo. 'To all staff. Stop wasting paper.'"

Nicaragua breaks the malaria chain

While the fight against malaria in tropical countries concentrates mainly on the use of pesticides, Nicaragua has approached the problem from another angle.

To break the chain of malaria transmission from people to mosquitoes and back to people, the country's health authorities decided to focus on the transmission of malaria-causing germs from people to mosquito.

Studies show that if the infection could be eliminated among all people even for only three weeks, the mosquitoes would not acquire the malaria organism and could no longer spread the infection.

Accordingly, 35 million antimalarial medicines were distributed for six weeks to the country's population of 2.8 million. The mammoth experiment seems to have been effective, despite opposition from some industrialists and clergy.

The aim of the program was to cut the number of malaria cases from 70,000 to 4,000 in 1982. Preliminary results show that this aim may have been exceeded. In the capital city of Managua, for example, only three cases were registered in the months following the campaign compared with 201 cases the month before.

Brazil dams face environment problems

To improve its energy supply and to reduce oil imports, Brazil is planning a network of dams on tributaries of the Amazon River.

Today these tributaries generate only about 65 megawatts of hydro power. By the end of the century Electronorte, the state-owned power company, expects to get 22,000 megawatts from harnessing the Amazonian rivers.

Past experiences with dam construction in tropical rainforest areas, however, indicate that the huge project will also cause huge environmental problems.

The Brazilian Curua Una hydroelectric project, on stream since 1977, gives a good example of the effects flooding large tracts of rainforest can have on the environment.

While the reservoir behind the Curua dam was filling, trees in the flooded forest started to decompose, producing large amounts of smelly hydrogen sulphide which affected people as far away as 60 km.

At the same time, decomposing vegetation acidified the water to such an extent that by 1982 the stainless steel casings of turbines in the power plant corroded and had to be replaced at a cost of $5 million.

Half of Curua's reservoir was soon covered with floating mats of water hyacinth and sedge. The hyacinth is unpalatable and toxic to most fish, absorbs nutrients and blocks sun penetration.

More serious, however, was the accumulation of weeds along the shores of the new lake. They provided a fertile breeding ground for carriers of malaria and bilharzia, two very dangerous diseases.

Bilharzia is caused by a parasitic flatworm carried by some aquatic snails. It penetrates human skin and causes diarrhea and cirrhosis of the liver. There is no certain cure.

Curua's reservoir is only one-twenty-fifth the size of the reservoir of the first big project in the damming of the Amazon basin, the $4 billion Tucurui dam on the Tocantis River.

The much larger Tucurui project is expected to produce, in addition to the kinds of problems caused at Curua, many more difficulties. One of them is the flooding of some 20 million cubic feet of good-quality timber. This timber will be mostly wasted, although Brazil is a net importer of wood. According to Brazilian authorities, there is not enough time to harvest it.

Other problems will be caused by erosion and by the partial or total flooding of reserves set aside for Indian tribes. Some of these are under severe stress now caused by the construction of highways and power lines and by the encroachment of squatters hoping to take advantage of industrial development expected as a result of the hydro project.

Britain recycles water

Over 70 per cent of Britain's drinking water contains some sewage effluent, reports New Scientist. During a drought in 1975-76, all of London's drinking water had made the rounds of houses and factories at least once, and today "re-use" remains high in the city. In the rest of the country, recycled water normally makes up to 50 per cent of the domestic water supply.

Dioxin disappearing

An anonymous East European government informed the city fathers of Malmö, Sweden, that it would be quite willing to take 300 litres of dioxin out of their hands in return for hard currency, New Scientist reports.

The Malmö stock of this deadliest of poisons is the last remains of a pesticide plant closed in 1977. The chemical was found some 5 km from the plant after the discovery of a leak.

The plant has since been demolished, but no means for the disposal of the dioxin could be found.

There are indications that the dioxin released by an explosion in a pesticide plant in Seveso in northern Italy in 1976 has also found its way into Eastern Europe.

Givaudan, the owner of the Seveso chemical works, claims that it has moved 75 kg of waste containing up to 300 grams of dioxin out of Italy to an unknown destination.

The waste, a spokesman for the company said, has been transported to a clay-lined site which already contained dioxin. He refused, however, to identify the site or the recipient country.

About 30,000 cubic metres of soil contaminated by dioxin in the Seveso explosion has been buried in a 10-metres-deep dump sealed with a plastic lining next to a highway leading to Seveso. Pumps keep the dump dry and protect local watercourses.

First bionic trout

The world's first bionic pollution detector — a rainbow trout equipped with a sensor of electrical brain activity, a computer to analyse it and a transmitter — has been developed by Professor Jean-Louis Huvé at the Universitè Pierre et Marie Curie in Paris.

Trout are very sensitive to substances dissolved in water, and their brains show electrical activity in reaction to chemicals in concentrations as low as 10 parts per billion. A number of pollutants such as lindane, PCBs and methyl mercury can be distinguished by the patterns of brainwaves their presence causes at levels well below European standards.

The trout can live for two years with the equipment attached to its head.

Fear paralyzes toxic waste disposal

Widespread fear of hazardous wastes is often freezing rational progress toward comprehensive waste management solutions, reports Steve E. Hrudey, professor of environmental engineering at the University of Alberta, after a visit to 40 hazardous waste facilities in North America and Europe.

The siting of new plants and the operation of existing plants have become mired in a swamp of adverse reaction.

"The basic problem lies in the failure of the public to maintain perspective," Prof. Hrudey says. Finding 500 parts per million of PCBs in a batch of butter on a supermarket shelf merits rapid action — but finding 500 ppm of PCBs in the oil in a sealed transformer merits only reasonable caution. This case does not present an imminent health hazard unless the transformer is mishandled.

Such a distinction is well appreciated by scientists, but is rarely explained to or understood by the public.

Lack of perspective is particularly likely when carcinogens are discussed. People do not easily comprehend risks of one in a million in terms of their own health.

In reality, most "hazardous wastes" being processed by regulated off-site plants are not classified as highly toxic. Most of them only pose environmental problems when they are badly managed — as they usually were before adequate facilities became available. "Yet," Prof. Hrudey says, "the fear-induced paralysis of siting adequate facilities will eventually ensure that bad waste management occurs more often."

Japan helps rainforests

Malaysian rainforests will be exhausted by 1990, according to a report presented at a meeting of the British Association for the Advancement of Science.

In Indonesia, virtually all accessible lowland forests have been let as timber concessions, and the forests in Papua Nuinea will be the next to suffer.

Most of the timber is exported to Japan, which imports 50 per cent of all wood traded in the world.

In regions of tropical forests, reforestation is rarely practiced.

Facing dwindling resources, Japan has taken the initiative to secure the future of tropical rainforests by suggesting that a regulatory trade organization be formed. This organization would also provide funds for reforestation, forest management, the development of a local wood processing industry and act as a forestry information and training clearinghouse.

Japan's pulp manufacturers are also preparing to spend $230 million to establish plantations of fast-growing trees in selected countries.

Bathwater reused

Flushing toilets with bathwater and water from washing machines could save British households over 30 per cent of their drinking water, reports the Building and Environmental Health Department of Trent Polytechnic in Nottingham, England.

Dioxin compensation

Thirty-two workers employed in the clean-up of a dioxin spill from a ruptured tank car were awarded at least $1 million each in compensations for damages and sufferings by an Illinois jury. The workers complained of ailments ranging from dizziness and fatigue to impotence and loss of memory.

New York, Quebec co-operate

An agreement to co-ordinate acid rain research has been signed by officials of the Quebec and New York State environmental agencies. An annual report on acid rain will be published by a committee established to avoid duplication in acid rain research and to ensure standardized laboratory procedures.

Reaching standards the easy way

The New Mills, North Derbyshire, England, sewage treatment plant met, for the first time in living memory, effluent quality standards in 1980, reports New Scientist.

This success was not achieved by the development of a new treatment that would remove pollutants flowing through the plant from the textile industry in the area.

The North West Water Authority used a much simpler (and cheaper) method. It increased the BOD (biological oxygen demand) target from 20 mg/1 in 1979 to 400 mg/1. A decrease in textile industry production caused by the depressed economy may also have helped.

The dark cloud of this news item, however, has a silver lining: the New Mills sewage treatment plant is outdated and will be replaced in the near future by a new system better designed to cope with discharges from textile plants.

Ministry of the Environment

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